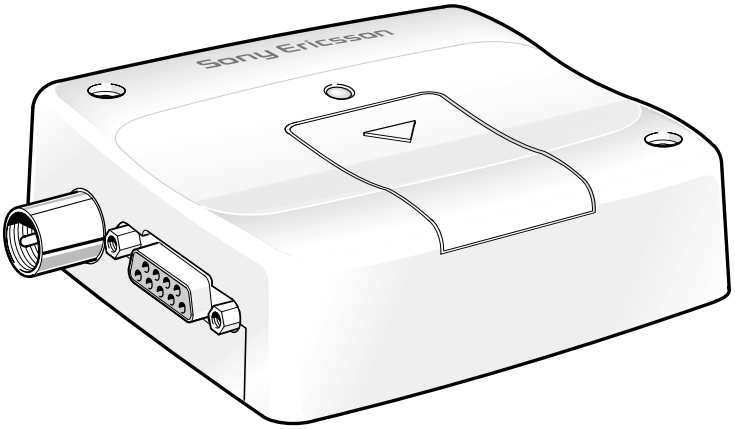
GM29

User Guide

Draft PA2

5.7.02



Sony Ericsson

CE

The product described in this document conforms to the Radio and Telecommunication Terminal Equipment (R&TTE) directive 99/5/EC with requirements covering EMC directive 89/336/EEC and Low Voltage directive 73/23/EEC. The product fulfils the requirements according to 3GPP TS 51.010-1, EN 301 489-7 and EN60950.

SAR statement: This product is intended to be used with the antenna or other radiating element at least 20cm away from any part of the human body.

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Contents

Introduction

Description

The dual band EGSM 900/1800 MHz GM29, is a GSM/GPRS serial modem. The modem is a powerful and flexible device that can be used in a wide range of telemetry and telematics applications that rely on the remote exchange of data, voice, SMS or faxes via the GSM cellular network.

Small and lightweight, the GM29 has standard connectors and an integral SIM card reader making it easy and quick to integrate. As well as providing a standard RS232 serial communication interface the GM29 also has an audio interface allowing an analogue handset to be connected. When the GM29 is integrated into an external application, a wireless communicaions system is created.

A typical end-to-end system consists of a micro controller in an external application communicating, via the GM29 modem, with a remote terminal or host using the GSM network. The micro controller uses a set of AT commands to control the modem, and to set up the end-to-end communications link, via its 9-way RS232 serial interface.

GM29 serial modems are intended to be used by manufacturers, system integrators, application developers and developers of a wide range of equipment and business solutions, typically in the following fields:

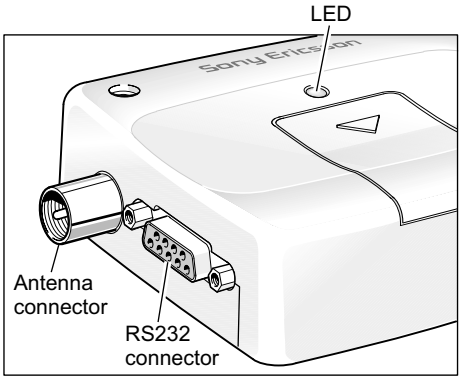
- Security and alarms
- Vending
- Monitoring and control
- Utilities
- Fleet Management

Simply connect the GM29 into your application as described later in this guide.

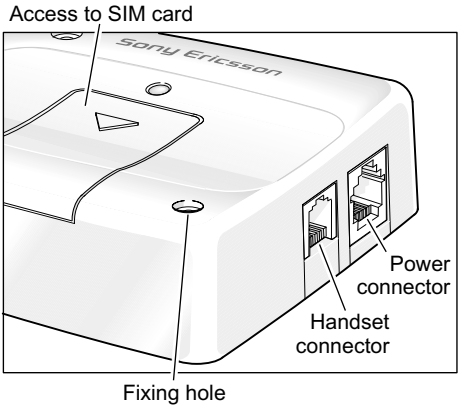
Highlights

- Dual band, EGSM 900/1800 MHz, GSM/GPRS serial modem
- Flexible plug-and-play device
- Data: GPRS, HSCSD, CSD, SMS
- Voice: full rate, enhanced full rate, half rate
- SMS: mobile-originated, mobile-terminated, cell broadcast
- Fax: Group 3, Classes 1 & 2
- 5 V to 32 V d.c. input
- Standard connectors
- R&TTE type approved

View of Left Side



View of Right Side



Installation

Safety and Installation Information

[Needs to be checked and re-written]

- The Terminal should be installed and setup only by qualified personnel.
- Connect a fast 1.25A fuse to the incoming line for the positive supply voltage to protect the Terminal.
- If a power supply unit is used to supply the GM29 modem, it must meet the demands placed on SELV circuits in accordance with EN60950. When using batteries and accumulators, adhere to the relevant regulations.
- The maximum permissible connection length between the GM29 Modem and the supply source is 3m.
- Your supplier will be pleased to provide you with a detailed technical description and technical support for the GM29 Modem.

Securing the Modem

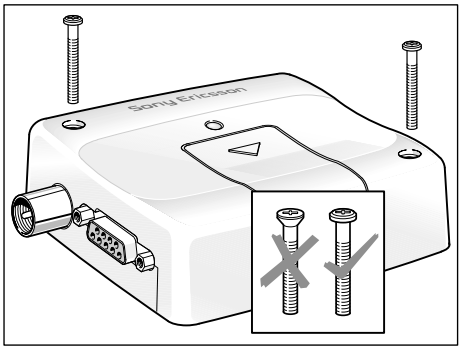
NOTE! Before securing the modem take into account the amount of additional space required for the mating connectors and cables that will be used in the application.

NOTE! Where access is restricted, it may be easier to connect all the cables to the modem prior to securing it in the application.

Securely attach the GM29 modem to the host application using two 3mm diameter pan-head screws of appropriate length as shown below.

CAUTION! Do not over tighten the fixings screws. Excessive torque applied to the screws can crack the plastic case.

Fixing Screws



Electrical Connections

All electrical connections to the GM29 are protected in compliance with the standard air (4kV) and contact (8kV) discharge ESD tests, of EN 301 489-1.

The modem uses the following industry standard connectors:

- RJ11 6-way (power connector)
- RJ9 4-way (audio connector)
- SIM card reader
- FME male coaxial jack (antenna connector)
- Sub-D socket, 9 pin (RS232 serial port)

Power Connector

An RJ11 6-way connector, as shown and described below, serves as a means of supplying and controlling d.c. power to the modem.

Connect positive power to VCC (pin 1) and the ground or negative to GND (pin 6). VCC and GND are reverse polarity and overvoltage protected

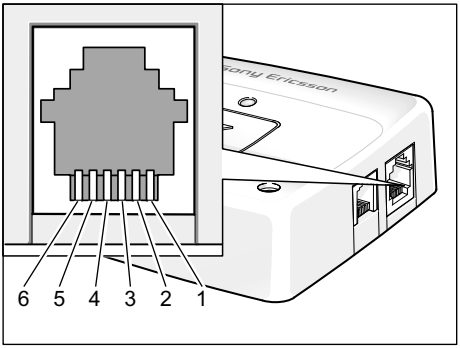
NOTE! Application of the supply voltage VCC, does not automatically switch on the modem.

Switch on is usually achieved by use of the TO_IN signal, which can be supplied by the host application. Alternatively the modem can be switched on at the same time that power is applied by hard-wiring TO_IN to VCC. Refer to “Switching On the Modem” on page 10 for information on switch on methods.

Similarly the host application can be designed to switch off the GM29 or perform a hard reboot of the modem's software by use of the HR_IN signal. Refer to “Switching Off the Modem” and “Resetting the Modem” on page 10 for additional information.

TO_IN and HR_IN are referenced to GND.

RJ11 Power Connector



1 VCC 3 HR_IN 5 n/c
2 n/c 4 TO_IN 6 GND

Signal	*Description*
VCC	Positive power input (5V to 32V d.c. at 1.5A_{max})
TO_IN	Active high control line used for switching on the modem (–0.5V to 32V; V_{IH} > 5V, V_{IL} < 2V)
HR_IN	Active high control line used to switch off or reset the modem (–0.5V to 32V; V_{IH} > 5V, V_{IL} < 2V)
GND	Negative power (ground) input and return path for TO_IN and HR_IN

Audio Connector

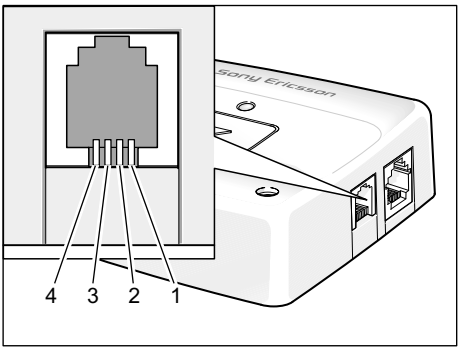
A 4-way RJ9 connector, as shown below, allows a telephone handset to be plugged into the modem, giving access to the microphone and earpiece signals. The connector may also be used to drive other analogue audio sub-systems or devices.

The GM29 is configured to work with a range of handsets.

CAUTION! Not all handsets use the pin-outs shown below for microphone and earpiece.

If necessary, changes can be made to the characteristics of the audio interface by sending the modem appropriate AT commands.

RJ9 Handset Connector



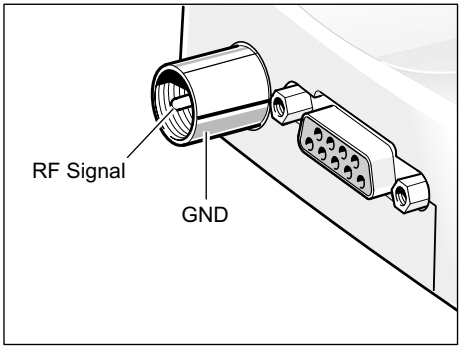
1 MICN 3 BEARP
2 BEARN 4 MICP

Signal	*Description*
MICN	Microphone negative input
BEARN	Earpiece negative output
BEARP	Earpiece positive output
MICP	Microphone positive input

Antenna Connector

Connect a GSM antenna to this port. Single (900 or 1800 MHz) or dual band (900/1800 MHz) antennas may be used. The modem is fitted with a 50 Ω, FME male coaxial jack.

FME Connector



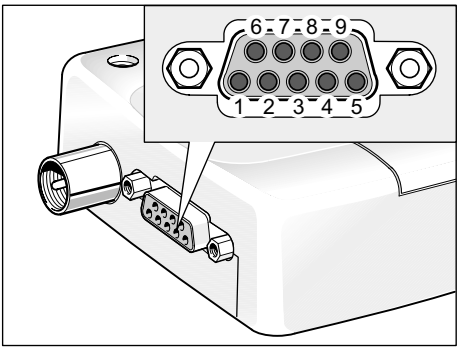
Signal	*Description*
RF	RF input/output
GND	Ground connection

RS232 Serial Port

The modem supports a standard RS232 serial interface (EIA/TIA 574) via its 9 pin Sub-D connector, shown below.

Link the GM29 to a microcontroller or computer in the host application, via the RS232 serial port. AT commands are used by the host-application software to communicate with the GM29.

Sub-D 9-pin Connector



1 DCD	4 DTR	7 RTS
2 RD	5 GND	8 CTS
3 TD	6 DSR	9 RI

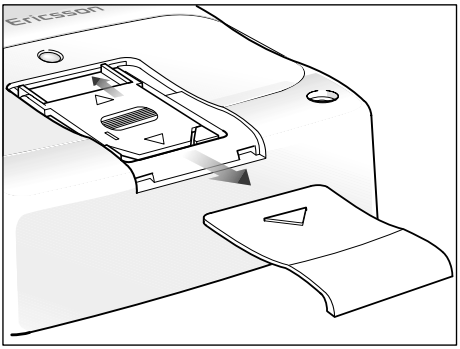
Signal	*Voltage levels*	*Description*
DCD	> +4V < –4V	Data carrier detect
RD	> +4V < –4V	Received data
TD	> 2V < 0.8V	Transmitted data
DTR	> 2V < 0.8V	Data terminal ready
GND	0V	ground connection
DSR	> +4V < –4V	Data set ready
RTS	> 2V < 0.8V	Request to send
CTS	> +4V < –4V	Clear to send
RI	> +4V < –4V	Ring indicator

SIM Card Reader

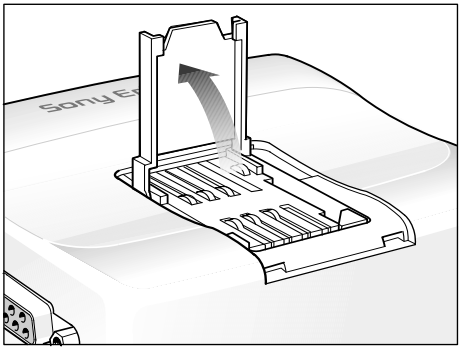
The GM29 is fitted with a SIM card reader in which 3 V and 5 V SIM cards will operate. The type of card fitted is automatically detected by the modem.

To operate the modem a SIM card must be fitted as follows:

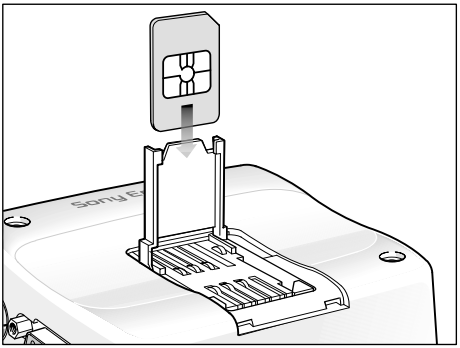
1. Disconnect power to the GM29;
2. Remove the cover panel by applying light downward pressure and sliding outwards as shown below;
3. Applying light pressure, slide the SIM card holder to the “OPEN” position as shown below;



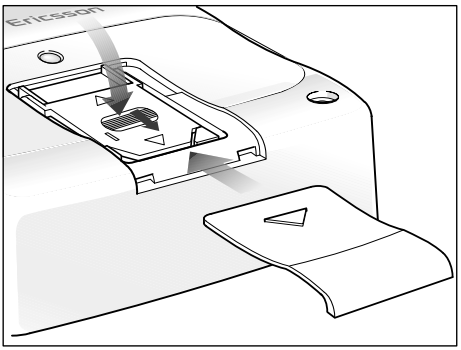
4. Carefully raise the SIM card holder until it is in the vertical position as shown below;



5. Orientate the SIM card and slide into the holder as shown below;



6. Close the SIM holder and slide into the “LOCK” positon;
7. Refit the cover panel.



To replace or remove a SIM card, follow the same procedure as described above except remove or exchange the card at step 5.

Operation

Before the GM29 can be operated the following conditions must apply:

- SIM card inserted (with the modem unpowered);
- antenna connected;
- RS232 port connected to the application computer;
- power applied.

Operation is not dependent on a handset being fitted. The type of application will dictate whether a handset is necessary.

Switching On the Modem

There are two ways to switch on the modem, once power is applied.

- either assert TO_IN high for > 0.2 s;
- or activate the RS232 control line DTR, high for > 0.2 s.

The modem is fully operational after 4 seconds. Logging onto a network may take longer than this and is outside the control of the modem.

The modem can be configured to start up at the time power is applied by permanently tying power connector signals TO_IN (pin 4) and VCC (pin 1) together. In this case DTR must be used to switch the modem on again after it has been switched off or reset, while power is still applied.

Switching Off the Modem

There are two ways to switch off the modem as described below:

- either use the appropriate AT command;
- or assert HR_IN high for 1 - 2 seconds. A delay of up to 10 s is experienced as the modem logs off the network.

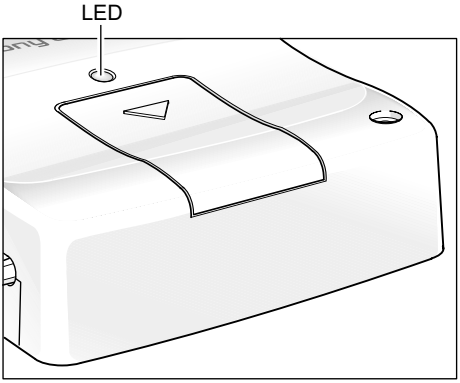
Resetting the Modem

A full system reset, independent of the status of the software, may be applied to the modem as follows:

- assert HR_IN high for > 3.5 s.

Operating States/LED

The GM29 has a green LED, as shown below, used to indicate various operating states. These states are described in the following table.



Operating state	*LED*
After switching on the modem	On after 4 s
Switch off or power removed	Off
Standby or talk	Flashing
Modem on with one of the following conditions: No network, network search, no SIM card, no PIN entered	On

Accessories

A range of type approved and recommended accessories for the GM29 are available through Sony Ericsson's distribution channels.

AT Commands

The GM29 is controlled and programmed by means of AT commands. For a complete list and detailed description of each command please refer to the Integrator's Manual on the CD accompanying this product.

Type Approval

The integrated nature of the GM29 should make type approval a minimal process. The type approval process may differ from country to country but in general no further type approval of the GM29 is needed when used with Sony Ericsson approved accessories and where the cable lengths are restricted to those shown in the table below.

Cable	*Maximum length (m)*
Power cable	3
Handset cable	3
Antenna cable	3
RS232 cable	3

Further type approval will be required if: ??

Software Updates

It is possible and sometimes necessary to update the embedded software. Updates must be carried out by a Sony Ericsson approved technician.

Please contact your supplier for details or contact Sony Ericsson directly (see "Service and Support" on page 11).

Certification

Tested and certified according to:

Directive 1999/5/EC

EMC: EN 301 489-1
EMC: EN 301 489-7
Safety: EN 60950
GSM 3GPP TS 51.010-1

Troubleshooting

Do not attempt to repair a damaged modem. Return it to your supplier for replacement or repair.

Modem Not Working

One of the following situations probably applies:

1. Power is not connected. Check the power source and connection to the RJ11 connector on the GM29.
2. Power is connected but a switch on signal has not been applied, see "Switching On the Modem" on page 10.
3. The modem is damaged.

Software Crashed

Perform a hard reset (see "Resetting the Modem" on page 10).

If this fails, the modem is probably damaged.

No Communication, Modem Switched On

Check the RS232 serial port connections and cable.

Check the application software.

Service and Support

To contact customer support please use the details below:

Customer Support
Sony Ericsson Mobile Communications
Maplewood Building

Chineham Business Park
Basingstoke
RG24 8YB

E-mail: modules.support@sonyericsson.com
or
modules.info@sonyericsson.com

Information about Sony Ericsson and its products is available on the following web site:

http://www.sonyericsson.com/M2M

Technical Data

Data Features

CSD	Up to 9.6kbps, transparent and non-transparent
HSCSD (2+1)	Up to 19.2kbps
GPRS Class B (4+1) - P channels - Coding schemes CS1 to CS4	85.6kbps (subject to network support and terminal location)
GSM	07.10 multiplexing protocol

Short Message Service Features

SMS	Text and PDU
	Point to point (MT/MO)
	Cell broadcast
	concatenation of up to 6 SMS

Voice Features

	Full Rate, Enhanced Full Rate and Hlf Rate (FR/ EFR/HR)
	Echo Cancellation and Noise Reduction
	Dual Tone Multi Frequency (DTMF

Fax Features

	Group 3
	Class 1 and 2

Data Storage

SMS storage capacity	40 in ME In addition, the unit can handle as many SMS as the SIM can store
Phone book capacity	100

Power Supply

Supply voltage range	5 - 32V d.c. at 1.5A$_{max}$

Average Power Consumption

		Idle Mode	Transmit/Operation
GSM900	Voice/CSD	<15mA	<250mA (<2A peak)
	Data (GPRS 4+1)	<15mA	<350mA (<2A peak)
GSM1800	Voice/CSD	<15mA	<250mA (<1.75A peak)
	Data (GPRS 4+1)	<15mA	<350mA (<1.75A peak)

NOTE! The power consumption during transmission is measured at maximum transmitted power.

Radio Specifications

Frequency range	GM29: EGSM 900MHz and 1800MHz (dual band)
Maximum RF output power	2W (900MHz) and 1W (1800MHz)
Antenna impedance	50Ω
Static sensitivity	Better than –102dBm

Audio Specifications

Parameter	Limit
Output level (differential)	≥4.0 V_{pp}
Output level (dynamic load = 32Ω)	≥2.8 V_{pp}
Distortion at 1kHz and maximum output level	≤5%
Offset, BEARP to BEARN	±30mV
Ear-piece mute-switch attenuation	≥40dB

Ear piece model	Impedance	Tolerance
Dynamic ear piece	[32Ω + 800µH] // 100pF	±20%
Dynamic ear piece	[150Ω + 800µH] // 100pF	±20%
Piezo ear piece	1kΩ + 60nF	±20%

SIM Card Reader

Voltage type	Support for 3 V and 5 V SIM cards

Electrical Connectors and LED

Plug-in power supply connector	RJ11 6-way
Handset audio connector	RJ9 4-way
Antenna connector	FME male
RS232 serial port	Sub-D socket, 9 pin
LED	Green

Mechanical Specification

Length	77.4mm
Width	66.4mm
Height	26.2mm
Weight	<130g

Environmental specifications

Operating temperature range	–25 °C to +55 °C
Storage temperature range	–40 °C to +85 °C
Relative humidity	5 - 95%, non-condensing
Stationary vibration, sinusoidal	Displacement: 7.5 mm Acceleration amplitude: 20 m/s² and 40 m/s² Frequency range: 2-8 Hz, 8-200 Hz, 200-500 Hz
Stationary vibration, random	Acceleration spectral density (m²/s²): 0.96, 2.88, 0.96 Frequency range: 5-10 Hz, 10-200 Hz, 200-500 Hz, 60 min/axis
Non-stationary vibration, including shock	Shock response spectrum I, peak acceleration: 3 shocks in each axis and direction; 300 m/s², 11 ms. Shock response spectrum II, peak acceleration: 3 shocks in each axis and direction; 1000 m/s², 6 ms.
Bump	Acceleration: 250 m/s²
Free fall transportation	1.2 m
Rolling pitching transportation	Angle: ±35 degrees; period: 8 s
Static load	10 kPa
Low air pressure/high air pressure	70 kPa/106 kPa

Certification

Directive 1999/5/EC	EMC: EN 301 489-1
	EMC: EN 301 489-7
	Safety: EN 60950
	GSM 3GPP TS 51.010-1
Tested according to GCF-CC	